REMARKS

The claims are claims 1, 3, 5, 6, 8 and 10.

Claim 1 is amended. Claim 1 is amended to correct a minor error. As amended claim 1 makes clear that the audio signal is formed from the output digital audio signal. This amendment was previously proposed after FINAL REJECTION and not entered because no appeal was filed to the FINAL REJECTION. Claim 1 is further amended to recite converting the output digital signal into sound. This subject matter is supported in the original application. The original application recites at page 2, lines 2 to 7:

> "Time-scale modification (TSM) is an emerging topic in audio digital signal processing due to the advance of low-cost, high-speed hardware that enables real-time processing by portable devices. Possible applications include intelligible sound in fast-forward play, real-time music manipulation, foreign language training, etc."

Recitation that time-scale modification is applied to produce "intelligible sound in fast-forward play" indicates the original application teaches sound generation. The original application recites at page 2, lines 19 to 25:

> "Frequency-domain time scale modification is generally believed to provide higher quality for polyphonic sounds than time-domain time scale modification, which is believed more suitable for narrow-band signals such as voice. This advantage for polyphonic sounds is achieved at the expense of higher computational cost."

This portion of the original application teaches providing higher quality sound which indicates the original application teaches sound generation. The original application recites at page 2, lines 26 to 30:

"Frequency-domain time scale modification produces some characteristic artifacts in the reconstructed sound. These include reverberation and loss of sound presence. A speaker may appear farther from the microphone in the reconstructed sound than in the original audio."

This portion of the original application teaches producing artifacts in reconstructed sound which indicates the original application teaches sound generation. The original application recites at page 3, lines 12 to 16:

"These methods generally eliminate reverberation but introduce additional artifacts making the resultant sound seem artificial or synthetic. Some of this artificiality can be mitigated by control of the scaling factor, but the sound is generally perceived of low overall quality."

This portion of the original application teaches producing artifacts in resultant sound and sound perceived of low quality which indicates the original application teaches sound generation. The original application recites at page 7, lines 20 to 22:

"This might include band equalization filtering, conversion between the various surround sound formats and the like."

The recitation of sound formats indicates the original application teaches sound generation. The original application recites at page 12, lines 3 to 5:

"Since the Bark bands approximate critical bands, it appears that maintaining phase coherence among peaks within critical bands is advantageous in sound quality."

The recitation of sound quality indicates the original application teaches sound generation. This application teaches output 131 for producing the claimed sound.

Claims 1, 3 and 5 were rejected under 35 U.S.C. 101 as

non-statutory subject matter. The FINAL REJECTION states that the claims "simply recite an abstract idea for converting digital audio signal."

Claim 1 recites statutory subject matter. Claim 1 now recites "receiving input digital audio data having a first time scale" and "converting the output digital audio signal into sound having a second time scale according to the desired time scale modification." This claim thus recites conversion of a thing (the input digital audio data having a first time scale) into a different thing (sound having a second time scale). The utility of this conversion is noted in the application at page 2, lines 2 to 7 which state:

> "Time-scale modification (TSM) is an emerging topic in audio digital signal processing due to the advance of low-cost, high-speed hardware that enables real-time processing by portable devices. Possible applications include intelligible sound in fast-forward play, real-time music manipulation, foreign language training, etc."

Provision of intelligible sound in fast-forward play is a useful, concrete and tangible result. Note that as currently presented claim 1 recites producing sound corresponding to a digital input signal with a second time scale.

The FINAL REJECTION of January 12, 2010 states at page 5, lines 1 to 11:

> "It is readily apparent that when claims 1, 3, and 5 are each taken as a whole, the claims are directed to the preemption of an abstract idea, and thus are non-statutory.
>
> "Claims 1, 3, and 5 are rejected under 35 USC 101 as not falling within one of the four statutory categories of invention. While the claims recite a series of steps to be performed, a statutory process under 35 USC 101 must be tied to another statutory category (such as a manufacture or a machine) or transform underlying subject matter (such as an article or material) to a different

> state or thing. The steps in those claims can be performed manually without the use of a particular machine. Those claims could be done in a piece of paper, by using digital signal processing (DSP) theory to derive all the values recited in the claims. Thus, claims 1, 3, and 5 do not define a statutory process."

The Examiner states that "claims 1, 3, and 5 are each taken as a whole, the claims are directed to the preemption of an abstract idea, and thus are non-statutory." The later specifics ignore the portions the amendment filed October 2, 2009 pointed out (page 6, lines 9 to 26) as indicative of statutory subject matter. The Examiner thus does consider the claims as a whole. Claim 1 as amended recites "converting the digital audio signal into sound." The FINAL REJECTION fails to state how producing a sound can be performed "in a piece of paper, by using digital signal processing (DSP) theory." The Applicants submit that this step cannot be performed on paper. As a whole independent claim 1 recites a method of producing sound. Producing sound is a concrete and tangible result. The above quoted portion of the application teaches this is useful. Thus claim 1 recites statutory subject matter. Accordingly, claims 1, 3 and 5 are statutory subject matter.

Claims 1, 3, 5, 6 and 8 were rejected under 35 U.S.C. 103(a) as made obvious by the combination of Laroche et al "Improved Phase Vocoder Time-Scale modification of Audio," IEEE TRANSACTIONS ON SPEECH AND AUDIO PROCESSING, Vol. 7, No. 3, May 1999 and Laroche U.S. Patent No. 6, 766,300.

Claims 1 and 6 recite subject matter not made obvious by the combination of Laroche et al and Laroche. Claims 1 and 6 recite calculating "a phase difference for each of a predetermined number of spectral lines near the dominant spectral line within each spectral band as the phase difference of the corresponding dominant spectral line" and calculating "a phase difference for other

spectral lines of each spectral band by the phase vocoder algorithm." This recitation of claims 1 and 6 requires different treatment of different spectral lines within each spectral band. For a predetermined number of spectral lines near the dominant spectral line the calculated phase difference corresponds to the phase difference of the dominant spectral line. For other spectral lines the phase difference is calculated by the phase vocoder algorithm. The FINAL REJECTION cites page 329, column 1, paragraph 3 and the last 15 lines of page 330, column 1 of Laroche et al as making obvious both these recitations. The Applicants submit that Laroche et al clearly teaches that phase difference calculation for all these non-dominant spectral lines is the same. The bottom of page 330, column 1 of Laroche et al (within the portion cited by the Examiner) includes:

> "4) For each channel around the peak channel, calculate analysis phase difference between peak and current channel, and calculate current synthesis phase using (16).
> "5) Repeat the above steps for the next peak, until all peaks have been processed."

The above quoted paragraph 5) from Laroche et al states that phase calculation for all peaks is the same. This is contrary to the requirement of claims 1 and 6 that "a predetermined number of spectral lines near the dominant spectral line" have a different phase calculation than "other spectral lines." Explicitly stating that the phase calculation for all peaks is the same fails to make obvious the differing phase calculation for differing spectral lines recited in claims 1 and 6. Accordingly, claims 1 and 6 are allowable over the combination of Laroche et al and Laroche.

The FINAL REJECTION states at page 2, lines 11 to 16 (emphasis in original):

> "The examiner disagrees, since Laroche et al., (1999) discloses that "the neighboring channels can be synchronized to the peak, and the identity phase-locking equation can be generalized as... **For each channel around the peak channel, calculate analysis phase difference between peak and current channel, and calculate current synthesis phase using (16)**" [page 330, col. 1; equation 16 shows that non-dominant peaks have a different phase calculation than dominant peaks]"

The fact that equation 16 of Laroche et al discloses different phase calculation for non-dominant peaks than for dominant peaks does not make obvious these limitations of claims 1 and 6. Claims 1 and 6 recite two different groups of non-dominant spectral lines: a predetermined number of spectral lines near the dominant spectral line within each spectral band; and other spectral lines of each spectral band. Thus claims 1 and 6 clearly recite different phase calculation for two different groups of non-dominant spectral lines. The teaching of Laroche et al that the phase calculation differs for dominant spectral lines and non-dominant spectral lines fails to make obvious different phase calculation for differing groups of non-dominant spectral lines. Note further that claims 1 and 6 do not merely recite that the phase calculations for these two groups of non-dominant spectral lines may result in differing calculated phases. Claims 1 and 6 recite calculating the phase "as the phase difference of the corresponding dominant spectral line" for the predetermined number of spectral lines near the dominant spectral line within each spectral band and calculating "a phase difference for other spectral lines of each spectral band by the phase vocoder algorithm" for the other spectral lines. Claims 1 and 6 recite that the manner of calculation differs for these two groups. In contrast, Laroche et al applies the calculation of equation 16 to all non-dominant spectral lines. Accordingly, claims 1 and 6 are not made obvious by the combination of Laroche et al and Laroche.

The Examiner has consistently ignored the claimed distinction

between a predetermined number of spectral lines near the dominant spectral line within each spectral band and other spectral lines of each spectral band recited in claims 1 and 6. The OFFICE ACTION of June 18, 2007 states at page 4, lines 4 to 11 regarding claim 1:

> "calculating a phase difference for each of a predetermined number of spectral lines near the dominant spectral line within each spectral band as the phase difference of the corresponding dominant spectral line (see col. 5, lines 34-37, where the predetermined number is the number of divided frequency regions); "calculating a phase difference for other spectral lines of each spectral band by the phase vocoder algorithm (see col. 5, lines 34-37, where it is indicated that it is perferable to only calculate for significant peaks, indicating the phase of other peaks may be calculated);"

The OFFICE ACTION of June 18, 2007 includes similar language at page 6, line 20 to page 7, line 6 regarding claim 6. The OFFICE ACTION of March 7, 2008 states at page 3, lines 7 to 12 regarding both claims 1 and 6:

> "calculating a phase difference for each of a predetermined number of spectral lines near the dominant spectral line within each spectral band as the phase difference of the corresponding dominant spectral line; calculating a phase difference for other spectral lines of each spectral band by the phase vocoder algorithm ("phase values are shifter by subtracting the same number that was subtracted from the phase value for the significant peak", col. 5, lines 50 -60); and"

Note that rejection of these two different paragraphs of claims 1 and 6 is now merged into a single rejection based upon a single citation of the reference. The OFFICE ACTION of October 1, 2008 includes this same language at page 5, line 18 to page 6, line 2. The OFFICE ACTION of June 12, 2008 states at page 6, lines 16 to 20 regarding both claims 1 and 6:

> "calculating a phase difference for each of a predetermined number of spectral lines near the dominant

spectral line within each spectral band as the phase difference of the corresponding dominant spectral line; calculating a phase difference for other spectral lines of each spectral band by the phase vocoder algorithm **("calculate analysis phase difference between peak and current channel, and calculate current synthesis phase using (16)"**; see also the steps of the scaled-phase-locking scheme summary; page 329, col. 1, paragraph 3; page 330, col. 1, last 15 lines); and"

Note that rejection of these two different paragraphs of claims 1 and 6 is merged into a single rejection based upon a single citation of the reference. The OFFICE ACTION of January 12, 2010 includes the same language at page 6, lines 15 to 21. The Applicants have consistently pointed out that these are two different limitations that cannot both be made obvious by the same portion of a reference at: response filed September 17, 2007 at page 11, lines 19 to 22; response filed June 9, 2008 at page 8, lines 4 to 6; response filed December 1, 2008 at page 9, lines 1 to 11; appeal brief field March 5, 2009 at page 13, line 23 to page 14, line 4; and response filed October 2, 2009 at page 8, line 27 to page 9, line 5. Failure to separately consider and separately argue limitations the Applicants have repeatedly urged as distinct represents a failure to make a prima facia case for rejection. Accordingly the present rejection should be withdrawn.

Claims 1 and 6 recite yet further subject matter not made obvious by the combination of Laroche et al and Laroche. The cited teaching of Laroche et al fails to make obvious the phase vocoder technique recited in claims 1 and 6 applied to the other spectral lines. Paragraph 4) quoted above refers to equation (16) detailed in Laroche et al page 330, column 1, lines 11 to 21 which is described as scaled phase locking. Laroche et al teaches this portion including equation (16) is characterized as scaled phase locking. Equation (16) of Laroche et al fails to make obvious the phase vocoder calculation recited in claims 1 and 6. Laroche et al

teaches phase vocoder phase calculation (applied to the dominant peak) at page 324, column 2, second full paragraph to page 325, column 1, fourth paragraph including equation (6). Thus Laroche et al teaches that equation (16) is not the phase vocoder recited in claims 1 and 6 applied to the other spectral lines. Accordingly, claims 1 and 6 are allowable over the combination of Laroche et al and Laroche.

Claims 3 and 8 recite subject matter not made obvious by the combination of Laroche et al and Laroche. Claims 3 and 8 recite merging "nearby spectral lines that are within a predetermined frequency range of each other prior to calculating the phase difference." The FINAL REJECTION cites Laroche et al at page 330, column 2, the last 5 lines and page 325, column 1, the second paragraph as making obvious this limitation. The first cited portion of Laroche et al states:

> "Once the instantaneous frequency at time is estimated, the phase of the time-scaled STFT at time is set according to the following *phase-propagation* formula
>
> $$\angle Y\left(t_s^u,\Omega_k\right)=\angle Y\left(t_s^{u-1},\Omega_k\right)+R_s\,\hat{\omega}\left(t_a^u\right) \qquad (6)$$
>
> "Equation (6) guarantees what can be called 'horizontal phase coherence': for a *constant-frequency* sinusoid, successive short-time signals will overlap coherently. Another way of saying this is that there is coherence *within* each frequency channel over time (i.e., along the horizontal dimension of a standard sonagram)."

The second cited portion of Laroche et al states:

> "Table II presents the consistency measure for the speech signal. Again, our phase-synchronization techniques outperform loose phase locking, but some marginal improvement in consistency can be obtained by the iterative procedure, with a large number of iterations. Also included is the consistency measure for pitch-synchronous overlap add (PSOLA), a high-

quality time-domain technique based on overlap-adding small segments of waveform [7]."

The Applicants submit these teachings of Laroche et al include no mention of the claimed spectral lines or any equivalent, or of the claimed merging or any equivalent. The teaching that the "short-time signals will overlap coherently" and the "overlap-and adding small segments of waveform" taught in these portions of Laroche et al refer to overlap in time during the synthesis in constructing the time scale modified final signal. This corresponds to the discrete Fourier transform calculation and the inverse discrete Fourier transform calculation recited in both claims 1 and 6. The Applicants respectfully submit that data frames overlapping in time cannot make obvious the merging of spectral lines recited in claims 3 and 8. While the FINAL REJECTION states that the cited portion of Laroche et al makes obvious the claim limitations, the FINAL REJECTION includes no citation to language in Laroche et al that corresponds to the claim language. Accordingly, claims 3 and 8 are not made obvious by the combination of Laroche et al and Laroche.

Claim 5 recites subject matter not made obvious by the combination of Laroche et al and Laroche. Claim 5 recites partitioning "the spectrum into a plurality of contiguous spectral bands according to a Bark scale by adjusting boundaries of spectral bands to maintain important frequency groups within the same spectral band." This subject matter is the same as allowable claim 10 and is likewise allowable.

The application has been further amended at many locations to correct minor errors and to present uniform language throughout. The amendments include correction of those errors noted by the Examiner.

The Applicants respectfully request entry and consideration of this amendment. Entry of this amendment is proper at this time

because the amendment serves only to clarify subject matter previously recited. Thus no new search or reconsideration is required.

The Applicants respectfully submit that all the present claims are allowable for the reasons set forth above. Therefore early entry of this amendment, reconsideration and advance to issue are respectfully requested.

If the Examiner has any questions or other correspondence regarding this application, Applicants request that the Examiner contact Applicants' attorney at the below listed telephone number and address to facilitate prosecution.

Texas Instruments Incorporated
P.O. Box 655474 M/S 3999
Dallas, Texas 75265
(972) 917-5290
Fax: (972) 917-4418

Respectfully submitted,

/Robert D. Marshall, Jr./
Robert D. Marshall, Jr.
Reg. No. 28,527